DIESEL BUSES, OIL PRICES AND PREMATURE DEATHS FROM PARTICULATE MATTER:

Understanding the Connections, Exploring Solutions

MARCH 2000

Environmental and Energy Study Institute

122 C Street, NW
Suite 700
Washington, D.C. 20001
Phone: 202-628-1400
Fax: 202-628-1825
E-mail: eesi@eesi.org
Website: www.eesi.org

Carol Werner
Executive Director

Responding to the recent increase in oil prices, Congress has held a round of hearings in search for solutions. On the supply side, suggested solutions include pressuring the Organization of the Petroleum Exporting Countries (OPEC) to increase oil production significantly, drawing down the Strategic Petroleum Reserves, increasing domestic production and off-shore drilling, and opening up wilderness areas for expanded domestic production. On the demand side, there are calls for increases in efficiency, conservation, and alternative fuels and technologies. Transit buses present a unique opportunity to introduce alternative fuels and advanced technologies because of their prevalence in Clean Air Act "non-attainment" areas; their centralized fueling stations; their operation mostly by government entities; and their size, which accommodates alternative fuels and new engine types.

Congressman Jerrold Nadler (D-NY) and Congressman Brian Bilbray (R-CA) have each introduced legislation that restricts the use of federal funds for conventional diesel buses. The Department of Energy also has taken up this issue and is soliciting comments on whether they should require transit bus operators to switch to alternative fuels.
The Environmental and Energy Study Institute hosted a briefing to discuss the complex issues surrounding diesel buses and alternative-fuel buses. In particular, the panelists addressed the environmental, public health, and economic costs associated with diesel bus emissions and discussed both the costs and benefits of alternative-fuel buses.

WHAT'S WRONG WITH CONVENTIONAL DIESEL BUSES?

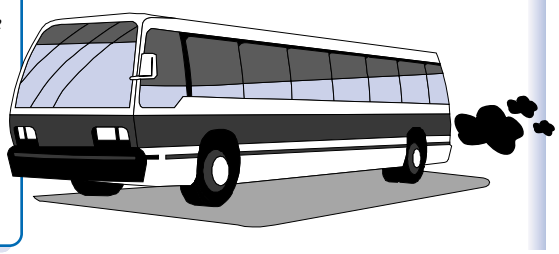
Conventional buses require enormous amounts of diesel fuel to run, and diesel fuel emissions pose a serious threat to the environment and ultimately to public health. In addition, reliance on diesel fuel helps to drive up the cost of oil. Many proponents of diesel buses support them because they are cheaper to purchase. However, according to the testimony of Joanna D. Underwood, President of INFORM, Inc., a non-profit environmental research organization, diesel buses can cost more over the life of the bus due to higher maintenance expenses.

PANELISTS

Representative Jerrold Nadler (D-NY)
Sponsor of H.R. 3326, *the Cleaner Buses for Cleaner Cities Act*

Richard Cromwell
Chairman, Alternative Fuels Committee, American Public Transit Association (APTA); *Director, Sunline Transit in Thousand Palms*, CA

Ruth Horton
Program Manager, Energy Efficiency Services, NY State Energy Research and Development Authority (NYSERDA)



Environmental and Health Concerns

According to the State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials (STAPPA/ALAPCO), the chemical compounds in diesel exhaust wreak havoc on the environment, "playing a role in ozone formation, particulate matter, regional haze, acid rain, and global warming." In addition, diesel exhaust contains "more than 40 chemicals categorized as air contaminants, known human carcinogens, probable human carcinogens, reproductive toxicants, or endocrine disrupters."

In the fall of 1999, the South Coast Air Quality Management District in Los Angeles released a report that concluded that approximately 70 percent of the total cancer risk was attributable to diesel particulate matter. At the briefing, STAPPA/ALAPCO announced the findings of a report published that day, "Cancer Risk from Diesel Particulate: National and Metropolitan Area Estimates for the United States." STAPPA/ALAPCO expanded the research done in Los Angeles to other cities nationwide and determined that 125,000 Americans may contract cancer as a result of diesel pollution. The report calls for the Environmental Protection Agency to set more stringent standards in order to reduce these environmental and health risks.

Representative Jerrold Nadler (D-NY) opened the briefing by discussing the environmental and health damage caused by diesel fuel usage in New York. Rep. Nadler explained how more than three quarters of New Yorkers live in areas with unhealthy air, also known as "ozone non-attainment areas." The problem is rated "severe" in the metropolitan region of New York City. In downstate New York diesel emissions are responsible for more than half of the particulate matter, though part of the bad air is due to truckers bringing in goods, since there is no rail freight to the region. In fact, downstate New York has the largest amount of particulate matter east of the Mississippi, an amount that is well above federal standards. The high particulate amount is reflected in a childhood asthma rate five times the national average.

Rep. Nadler offered the example of the Metropolitan Transit Authority (MTA) as one institution that is not being aggressive enough in embracing the newer, cleaner technology. In the 1999 capital plan, MTA proposed to purchase 1,056 new buses over the next five years, with a maximum of 300 alternative-fuel (diesel/electric hybrid) buses. According to Nadler, this figure is too low. Since conventional buses have a 12 to 15-year life expectancy, the proposed MTA plan ensures that new buses will be spewing diesel exhaust into the air of New York City until 2015.

In November 1999, Representative Nadler introduced HR 3326, the Cleaner Buses for Cleaner Cities Act, to address the problems caused by diesel particulate matter. If enacted, this bill would eliminate federal transportation funding to any agency that purchases diesel-fueled buses in areas that fail to comply with federal air quality standards enacted by the federal government.

Economic Concerns

One standard argument offered by proponents of diesel buses is that conventional buses are cheaper for cities to purchase and maintain. Also, many cities claim to be waiting for the zero-emission technology – hydrogen-powered fuel cells – to be perfected before making any change at all.

Presently it costs about $35,000 to $50,000 more to purchase a compressed natural gas (CNG) hybrid bus than to purchase a conventional diesel bus, and parts for CNG buses are 25 percent more expensive. However, the extra up-front cost is paid back in lower maintenance and fuel costs in 6 to 8 years. And, as SunLine Transit discovered when it purchased its alternative-fuel powered fleet, federal funds covered 80 to 90 percent of the cost, leaving SunLine a cost of only $3,500 per bus. The largest expense associated with alternative fuels is the capital investment required to rebuilding the fuel infrastructure. New York City DOT estimates that it will cost $7 million to renovate each of the four remaining depots in the city.

WHAT ARE THE ALTERNATIVE-FUEL AND ADVANCED TECHNOLOGY SOLUTIONS?

There are several alternative fuel solutions available for transit companies, and the technology continues to improve: CNG-hybrid electric, diesel-hybrid electric, electric battery, hydrogen fuel cells, and biofuels. Presently, however, only about 20 percent of bus orders are for alternative-fuel buses. Of those, about 75 percent use CNG. Researchers also predict that by the end of the decade, zero-emissions hydrogen-powered fuel cells will become commercially available. Electric battery-powered buses currently exist, but work best only for short distances.

Environmental and Health Benefits

Using alternative fuels instead of diesel gas provides several environmental and health benefits, including improved air quality, decreased ground level ozone, and decreased respiratory problems. According to INFORM, a non-profit environmental research organization, CNG buses emit 95 percent fewer particulates than diesel buses, and they also emit lower levels of Volatile Organic Compounds and Nitrogen Oxides, both precursors to ground level ozone. Replacing a conventional diesel bus with a CNG bus is equal to removing the soot from 20 to 30 cars. Furthermore, over the typical 12 to 15-year life of a single bus, using one powered by alternative fuels will save more than 190,000 gallons of diesel fuel.

Using alternative fuels instead of diesel gas provides several environmental and health benefits, including improved air quality, decreased ground level ozone, and decreased respiratory problems.

Economic Benefits

About 30 transit agencies have already made full or partial switches to alternative-fuel buses, and many of these agencies have realized financial savings. For instance, in Sacramento, more than half of their 210-bus fleet uses CNG. Instead of requiring an engine overhaul at 200,000-250,000 miles, as a diesel bus would, these CNG-fueled buses have gone more than 270,000 miles with no engine overhauls. The United Parcel Service has also seen success. Their fleet of more than 800 non-gas vehicles has operated since 1989.

While the initial outlay for alternative fuels is higher, the long-term costs are lower. Converting depots to provide alternative fuels, the largest cost component, is a one-time capital expense. However the ongoing costs of fuel and maintenance can be lowered with alternative fuels. For instance, a gallon of CNG costs 15-40 percent less than diesel gas. SunLine Transit found that the cost of labor and fuel for a CNG bus was approximately half of that for a conventional diesel bus.

The cost for purchasing alternative-fuel buses can also be lowered by increasing the volume of the order. For instance, the New York City Transit Authority recently ordered 125 diesel-hybrid electric buses. Making such a large-scale purchase of alternative-fuel buses – the largest in the country to date – has lowered the incremental cost of owning and operating a bus by 50 percent.

An additional incentive to switch to alternative fuel transportation is that the broader economic benefits in creating and retaining jobs in industries that are developing these technologies. Ruth Horton, Program Manager at the New York State Energy and Research and Development Authority (NYSERDA), shared some success stories from New York. Two bus manufacturers in the state have created more than 200 high-tech jobs in order to develop hybrid-electric buses. The state also worked with Cummins to improve the engines that are produced in the New York plant.

SunLine Transit: A Case Study

Richard Cromwell, Director of SunLine Transit, shared his company's success story. SunLine Transit, based in southern California, converted 100 percent of its fleet to alternative-fuel engines, beginning in 1994. SunLine's fleet currently contains 46 CNG buses, 2 CNG

vans, 7 CNG street sweepers, 23 non-revenue CNG vehicles, plus a few electric pick-ups and trolleys.

Building depots throughout the 70 miles of desert was expensive, but SunLine defrayed the capital cost of the fueling depots by partnering with a fuel company to build the depots and making refueling available to other organizations in the region.

SunLine has reaped environmental and economic benefits from its decision to convert their fleet. Since implementation, about 150 million tons of pollutants have not entered the air, and SunLine has lowered the amount of hazardous waste that needs to be disposed. Additionally, labor and fuel costs have decreased by about 50 percent. Most of this savings comes from less frequent breakdowns, in part due to extensive emphasis on training the fleet's mechanics. For instance, an average bus makes a road call for assistance every 4,000 miles; SunLine's CNG buses average 29,000 miles between calls. Better buses have also led to a 25 percent increase in ridership.

POLITICAL SOLUTIONS

Representative Nadler issued a call to take action to decrease pollutants. He argues that government has the responsibility and power to get cleaner air, but constituents need to pressure officials to enforce the Clean Air Act. One option Nadler recommends to improve the situation would be to make all future bus purchases be powered by alternate fuels like natural gas.

As part of the 1998 Transportation Equity Act for the 21st Century (TEA-21), Congress has authorized the Clean Fuels Formula Grant Program, which authorizes up to $200 million annually as an incentive for local governments to use cleaner alternatives to conventional diesel-fueled buses. However, many of these funds have been earmarked for conventional diesel buses, and projects haven't been funded as intended because the Department of Transportation (DOT) hasn't approved the rule to implement the program. DOT needs to ensure that the money is spent as intended. Ruth Horton of NYSERDA noted that although New York State has received funding from state bond acts and CMAQ, it still faces a $45 million shortfall. She calls for Congress to direct funds better and also wants Congress to expand the funding for technical improvement.

In February 2000, California adopted the California Air Resources Board (CARB) Transit Bus Fleet Vehicle Rule, which will affect 8,500 buses in 75 transit authorities in the state. The transit authorities will have to convert buses to low-emission alternative-fuel buses or use clean diesel over the next twenty years. The goal is to reduce emissions of nitrogen oxides by 7 tons per day and particulate matter by 12 tons per day by 2020.

Writer: Randi Blank

For more information, please contact Carol Werner at (202) 662-1881 or cwerner@eesi.org.

Please visit us at: www.eesi.org

Special thanks to the Energy Foundation for their support of this briefing.